APPROVED BUDGETS SYSTEM

AND

TERMS OF REFERENCE FOR

1978 – 79 PROJECTS

April 1978

Sponsored jointly by

Alberta
ENVIRONMENT

Environment Canada
Environnement Canada

15th Floor, Oxbridge Place
9820 - 106 Street
Edmonton, Alberta, Canada
T5K 2J6

AOSERP 91-03122/

1978-79 BUDGET BREAKDOWN BY - SYSTEM

AND CORE ACTIVITY ($K)

SYSTEM	CORE ACTIVITY	ALBERTA	CANADA	TOTAL
AIR	Baseline States	172.25	186.75	359
	Applied Research-Modelling	119	222	341
				700
WATER	Baseline States	240	200	440
	Applied Research	90	180	270
	Research and Development	80	60	140
				850
LAND	Baseline States	261.25	208.75	470
	Applied Research	397.5	327.5	725
	Research and Development	137.5	167.5	305
				1,500
HUMAN	Baseline States	95	-	95
	Applied Research	155	-	155
				250
PROGRAM MANAGEMENT	Program Office	100	100	200
	Program Support	152.5	147.5	300
				500
	TOTALS	2,000	1,800	3,800

CANADA-ALBERTA

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

SYSTEM AUTHORIZATION: Air System

DESCRIPTION:

Research in the Air System is intended to elucidate baseline states with reference to regional, climatology and air quality in relation to relevant atmospheric processes of the study area. The Air System is intended to provide scientific support for other systems, by describing the nature, quantities and distribution of airborne pollutants which may affect the Land, Water or Human systems.

To meet these objectives, a program of research studies has been designed to establish meteorology and air quality data acquisition systems; to arrange for intensive field studies; to initiate studies of physical conditions and processes such as background air chemistry, magnitude of fog occurrence, chemical transformation and deposition processes; and to predict the impact of air pollution on the region by means of modelling these various processes. The research program is organized so that feasibility studies, field studies and literature reviews are carried out in the early phases of the research effort. The knowledge gained from these research activities is then applied to more complex projects designed to integrate the results of several studies. The goal of the Air System program is to understand the physical characteristics of all basic processes by the fifth year so that environmental effects of oil sands development can be predicted.

FISCAL YEAR	APPROXIMATE BUDGET	SHARE	
		CANADA	ALBERTA
1975-76	881	608	273
1976-77	557	385	172
1977-78	492	319	173
1978-79	700	408.75	291.25
1979-80	700	410	290
TOTAL	3,330	2,130.75	1,199.25

APPROVAL:

The following budget is approved for the 1978-79 fiscal year:

CANADA 408.75 ALBERTA 291.25

Approved for Alberta:

for MINISTER

2 March 78

Date

Approved for Canada:

MINISTER

March 9, 1978

Date

AOSERP

1978-79 BUDGET SUMMARY BY PROJECT ($K)

SYSTEM: AIR

PROJECT NO.	TITLE	FEDERAL-PROVINCIAL INTEREST RATIO	BUDGET ALLOCATION
AS 1	Meteorology Data Acquisition in the AOSERP Study Area.	75:25	194
AS 2	Air Quality Data Acquisiton in the AOSERP Study Area.	25:75	165
AS 2.5	Toxic Emissions from Oil Sands Developments.	50:50	24
AS 3.0	Plume Rise Measurements	75:25	36
AS 3.2	Background Air Quality in the AOSERP Study Area.	75:25	24
AS 3.5.3	Pollutant Transformation Processing in the AOSERP Study Area.	75:25	29
AS 3.5.4	Plume Chemistry Modelling	75:25	18
AS 3.5.5	Plume Chemistry Study	75:25	24
AS 3.6.2	Pollutant Deposition Processes (Field Trials).	75:25	22
AS 3.7	Emissions-Fog Interactions in the AOSERP Study Area.	75:25	18
AS 3.8.4	Atmospheric Turbulence in the AOSERP Study Area.	75:25	36
AS 4.2.3	Application of Atmospheric Dispersion Models.	75:25	60
AS 4.3	Low Level Meteorology Model for the AOSERP Study Area.	75:25	50
	TOTAL		700

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: 194,000 5.5 MY
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: AS 1	DURATION: 5 years STATUS: 4 of 5 years

TITLE:

Meteorology Data Acquisition in the AOSERP Study Area.

OBJECTIVES:

1. To elucidate meteorological processes relating to air quality in the AOSERP study area.
2. To provide input to simulation models, verify results of predictive systems and serve the needs of other research projects.

RESEARCH OUTLINE:

1. Operate and develop systems for collecting, processing and archiving of basic meteorological data for the AOSERP study area required to identify trends, topographic effects, unique characteristics due to latitude, elevation and topography, extreme conditions and local circulation patterns.
2. Provide monthly summaries of meteorological data to AOSERP.
3. Collect and provide specified meteorological data for use in other research projects.
4. Provide an interim report on 1978-79 research activities by March 1979.

PROJECT TO BE UNDERTAKEN BY:

Atmospheric Environment Service, Edmonton

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 8 March 78

for J.F. Bruce, Member for Canada — Date: 13/3/78

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: 165,000 5 MY
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 25 : 75
PROJECT NO: AS 2	DURATION: 5 years STATUS: 4 of 5 years

TITLE:

Air Quality Data Acquisition System in the AOSERP Study Area.

OBJECTIVES:

1. To operate a network of air quality stations to measure relevant atmospheric pollutants and provide baseline air quality data for other research projects.
2. To provide input to simulation modells and verify results of predictive systems.

RESEARCH OUTLINE:

1. Collect, process and archive air quality data from the AOSERP study area required to identify trends and verify results of predictive models.
2. Maintain an inventory of man-made and natural atmospheric emissions in the AOSERP study area.
3. Provide an interim report on 1978-79 research activities by March 1979.

PROJECT TO BE UNDERTAKEN BY:

Alberta Environment, Pollution Control Division

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 8 March 78

for J.P. Bruce, Member for Canada — Date: 13/3/78

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: $24,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 50 :50
PROJECT NO: AS 2.5	DURATION: 2 years STATUS: new

TITLE: Determination of Toxic Emissions from Oil Sands Development Activities

OBJECTIVES:

1. To determine the nature and amounts of toxic substances generated in oil sands upgrading and refining processes.
2. To determine how toxic substances are released to the atmosphere, how they are transformed, transported and deposited in the AOSERP study area.

RESEARCH OUTLINE:

1. Carry out complete organic and inorganic analysis of oil sands and bitumen to determine the presence, quantity and form of toxic constituents.
2. Review published literature with respect to toxic nature of constituents identified in oil sand and bitumen samples.
3. Analyse stack samples for gaseous and particulate fractions from GCOS and Syncrude to determine presence, concentration and form of toxic constituents.
4. Conduct ground level monitoring to determine presence, concentration and form of toxic constituents.
5. Provide an interim report on 1978-79 research activities by March 1979.

PROJECT TO BE UNDERTAKEN BY:

Consultant - to be defined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: Aug 22 78

J.P. Bruce, Member for Canada — Date: 13/8/28

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: 36,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: AS 3.0	DURATION: 5 years STATUS: 4 of 5

TITLE: Plume Rise Studies in the AOSERP Study Area

OBJECTIVES:

1. To derive plume rise and dispersion formulations from field measurements and relate them to theoretical models.
2. To prepare plume rise formulations for the AOSERP study area for air quality simulation models.
3. To ensure coordination of AOSERP related research activities within the Atmospheric Research Directorate, AES.

RESEARCH OUTLINE:

1. Synthesize and analyse data from field measurement program and intensive field studies.
2. Prepare plume rise and dispersion formulations.
3. Adapt formulations for application to the CRSTER and LIRAQ models.
4. Ensure results of other AES studies are available to model on schedule.
5. Coordinate field study activities and compile field study reports.

PROJECT TO BE UNDERTAKEN BY:

Atmospheric Research Directorate, AES, Downsview

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date 8 March 78

J.P. Bruce, Member for Canada — Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: 24,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: AS 3.2	DURATION: 2 years STATUS: 2 of 2 years

TITLE:

Background Air Quality in the AOSERP Study Area

OBJECTIVES:

1. To determine the atmospheric composition and concentration of background suspended particulates in the atmosphere at Birch Mountain for summer and winter periods.

2. To interpret the results of these measurements by relating them to results obtained under clean air conditions in other parts of Canada.

3. To determine chemical constituents in snow under ambient and background conditions.

RESEARCH OUTLINE:

1. Two-weekly samples from an aersol filter and vacuum pump at Birch Mountain will be taken for one year starting about January 1978. Samples will be analyzed using neutron activation techniques for nineteen elements.

2. Snow samples will be collected once during the winter from approximately 50 sites within 25 km of Mildred Lake and at several sites at a distance of 100 km. The samples will be analyzed for several metal elements by neutron activation and atmoic absorption spectrometry and for significant anions and cations by wet chemical methods.

3. Provide a final report for publication by March 1979.

PROJECT TO BE UNDERTAKEN BY:

Atmospheric Research Directorate - AES, Downsview

PROJECT APPROVED BY STEERING COMMITTEE:-

W. Solodzuk, Chairman — Date: 8 Nov 78

J.P. Bruce, Member for Canada — Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: 29,000 0.8 MY
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75 :25
PROJECT NO: AS 3.5.3	DURATION: 4 years STATUS: 3 of 4 years

TITLE:

Pollutant Transformation Processes in the AOSERP Study Area

OBJECTIVES:

1. To determine sulphur dioxide oxidation rates and other chemical reactions and to identify metal elements in the GCOS plume.
2. To develop a plume chemistry sub-model for the LIRAQ air quality simulation model.
3. To identify requirements for further plume chemistry measurements in the AOSERP study area.

RESEARCH OUTLINE:

1. Analyze plume samples from the 1977 field studies and from the results evaluate SO_2 oxidation rates for winter and summer.
2. Analyse samples for metals using neutron activation techniques.
3. Adapt the plume dispersion - plume chemistry model resulting from work by the LIRAQ air quality simulation model.
4. Prepare plans for a plume sampling study of the Syncrude facility to be implemented on a cooperative basis with industry.
5. Provide an interim report by March 1979.

PROJECT TO BE UNDERTAKEN BY:

Atmospheric Research Directorate, AES, Downsview

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 8 March 78

J.P. Bruce, Member for Canada — Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: 18,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: AS 3.5.4	DURATION: 2 years STATUS: 2nd year

TITLE: Plume Chemical Reactions - Modelling and Verification

OBJECTIVES:

1. To develop a compact numerical model of plume chemical reactions and validate by means of smog chamber experiments.
2. To combine the resulting chemical model with Gaussian plume dispersion model.
3. By means of the plume model interpret data on existing plumes from oil sands plants.

RESEARCH OUTLINE:

1. Develop a compact computer model of chemical reactions relevant to oil sand extraction and upgrading activities with emphasis on SO_2, NO_x, O_3 and Hc reactions.
2. Validate the model by means of smog chamber experiments.
3. Combine the chemical model with a Gaussian plume dispersion model to simulate entrainment of ambient air and include effects of solar altitude, temperature and wind.
4. Interpret data on plumes from operating oil sands plants.
5. Prepare an interim report in August 1978 and final report by March 1979.

PROJECT TO BE UNDERTAKEN BY:

Hydrocarbon Research Centre, University of Alberta

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 8 March 78

J.P. Bruce, Member for Canada — Date: 14/3/78

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: $24,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: AS 3.5.5	DURATION: 1 year STATUS: new

TITLE: Plume Chemistry Measurements in the AOSERP Study Area

OBJECTIVES:

1. To obtain information on plume behavior from a tall stack as a function of meteorological conditions and turbulent structure of the atmospheric boundary layer.

2. To determine the rates of SO_2 oxidation and composition and concentration of particulates in the plume.

RESEARCH OUTLINE:

1. Using airborne instruments carry out a short period of intensive chemistry and particulate measurements in a plume from a tall stack in the AOSERP study area.

2. By means of ground based measurements of wind and temperature and remote sensing temperature, wind, SO_2 and turbulence measurements obtain supporting information on plume behaviour.

3. Arrange for all field study support.

4. Prepare a report on plume behaviour and plume chemistry by 31 March 1979.

PROJECT TO BE UNDERTAKEN BY:

Atmospheric Research Directorate, AES, coordinated with industry and others.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 8 Dec 78 Date

J.P. Bruce, Member for Canada — Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: $22,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75: 25
PROJECT NO: AS 3.6.2	DURATION: 2 years STATUS: 2 of 2 years

TITLE: Field Trials of Pollutant Deposition Processes in the AOSERP Study Area

OBJECTIVES:

1. To follow up on recommendations resulting from a literature survey of pollutant deposition processes.
2. To conduct field trials to verify and quantify removal mechanism suggested for the AOSERP study area.

RESEARCH OUTLINE:

1. Evaluate the recommended dry and wet pollutant removal mechanisms proposed in the literature survey (AS 3.6).
2. Evaluate the alternate field study verification procedures recommended.
3. Implement the selected field verification program.
4. Evaluate results and comment on applicability of particular algorithms to model application.
5. Prepare a final report for publication by March 1979.

PROJECT TO BE UNDERTAKEN BY:

Consultant to be defined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 8 March 78

J.P. Bruce, Member for Canada — Date: 13/3/78

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: $18,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: AS 3.7	DURATION: 1 year STATUS: New

TITLE: Evaluation of Interaction Between Fog and Emissions in the AOSERP Study Area

OBJECTIVES:

To determine the extent to which there may be interaction between stack emissions, low level emissions and fog in the oil sands development area.

RESEARCH OUTLINE:

1. Assemble data from the past two years on the occurrence and chemical composition of low temperature fog and valley fog.
2. Model the meteorological and physical processes involved in the formation of these types of fog.
3. Predict plume behavior and evaluate low level emissions concurrent with fog events and determine the extent to which there may be interaction.
4. Provide a final report for publication by March 1979.

PROJECT TO BE UNDERTAKEN BY:

Consultant - to be defined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 8 March 78

J.P. Bruce, Member for Canada — Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: $36,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75: 25
PROJECT NO: AS 3.8.4	DURATION: 2 years STATUS: 2 of 2 year

TITLE: Measurements of Atmospheric Turbulence in the AOSERP Study Area

OBJECTIVES:

To review and evaluate the atmospheric turbulence data sets compiled from a variety or research projects in the AOSERP study area and implement a program of measurements to broaden this data base.

RESEARCH OUTLINE:

1. Review the consultant report (ME 3.8.3) on sigma data calculation for the AOSERP study area.
2. Evaluate alternatives proposed for field measurements to supplement the data set.
3. Implement a field measurement program to complete the data set.
4. Analyse data gathered in field measurement program and present in form compatable with requirements stated by modelling group.
5. To provide a final report for publication by March 1979.

PROJECT TO BE UNDERTAKEN BY:

Consultant - to be defined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 8 March 78 Date

J.P. Bruce, Member for Canada — 15/3/78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: 60,000 2.0 MY
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: AS 4.2.3	DURATION: 4 years STATUS: 3 of 4 years

TITLE:

Application of Air Quality Simulation Models to the AOSERP Study Area

OBJECTIVES: Through the application of appropriate air quality simulation models,

1. To develop predictive systems for the determination of ground level concentrations and deposition rates of airborne pollutants resulting from oil sands processing activities.
2. To integrate deposition and chemical transformation processes into the formulation of the resulting models.
3. To predict the magnitude and areas of air pollution impact.

RESEARCH OUTLINE:

1. Adapt appropriate models to AOSERP study area conditions.
2. Develop data sets to test and verify models.
3. Perform sensitivity tests on model input parameters.
4. Operate models to provide specific predictive information.
5. Document modifications and adaptations and prepare an interim report by March 1979.

PROJECT TO BE UNDERTAKEN BY:

Atmospheric Research Directorate - AES, Downsview

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date 8 Mar 78

J.P. Bruce, Member for Canada — Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: AIR	1978-79 BUDGET: $50,000 0.6 MY
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: AS 4.3	DURATION: 1 year STATUS: new

TITLE:

Meteorological Model for the AOSERP Study Area

OBJECTIVES:

1. To formulate a sub-model which integrates meteorological processes, effects of topography and surface roughness into a predictive system compatible with the air quality simulation model.

2. To describe the air parcel trajectory between source and receptor under different meteorological conditions.

RESEARCH OUTLINE:

1. Review literature on meteorological trajectory and boundary layer models including work done by regional weather offices on air mass and synoptic weather typing.

2. Investigate the effects of topography on low level circulation patterns under a variety of stability conditions.

3. Select an approach which will yield the results required as meteorological input to an air quality simulation model.

4. Prepare a final report for publication by March 1979.

PROJECT TO BE UNDERTAKEN BY:

Atmospheric Research Directorate, AES, Downsview

PROJECT APPROVED BY STEERING COMMITTEE:-

W. Solodzuk, Chairman — Date: 8 Mar 78

J.P. Bruce, Member for Canada — Date

CANADA - ALBERTA

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

SYSTEM AUTHORIZATION: Water System

DESCRIPTION:

Water System research is intended to describe the baseline states of aqueous systems in the study area and to quantify, predict and verify physical, chemical and biological changes in those systems resulting from oil sands development. Major objectives of Water System research will be to provide the means by ready identification of the source, nature, quantity and distribution of waterborne pollutants, as well as to develop methods for restoration of disrupted water bodies or enhancement of others as mitigation measures and methods for biomonitoring and protecting systems in undeveloped portions of the study area.

Research in the Water System has encompassed studies in the fields of Aquatic Fauna, Hydrology and Hydrogeology. The general thrust of the research effort has been to describe the baseline states of aqueous ecosystems in the study area prior to entering into a phase of applied research in years four and five of the Program. Baseline studies have included surface water, ground water and water quality investigations on regional basis as well as aquatic biological studies on a whole watershed-ecosystem basis.

ESTIMATED BUDGET ($K):

FISCAL YEAR	APPROXIMATE BUDGET	SHARE	
		CANADA	ALBERTA
1975-76	1,800	961	839
1976-77	1,107	735	372
1977-78	938	488	450
1978-79	850	440	410
1979-80	825	425	400
TOTAL	5,520	3,049	2,471

APPROVAL:

The following budget is approved for the 1978-79 fiscal year:

CANADA [440] ALBERTA [410]

APPROVED FOR ALBERTA

for MINISTER

2 March 78
Date

APPROVED FOR CANADA :

MINISTER

March 9, 1978
Date

AOSERP

1978-79 BUDGET SUMMARY BY PROJECT ($K)

SYSTEM: WATER

PROJECT NO.	TITLE	FEDERAL-PROVINCIAL INTEREST RATIO	BUDGET ALLOCATION
WS 1.1	Hydrometric and Suspended Sediment Data Collection	50:50	110
WS 1.1.1	Synthesis of Hydrometric Data	50:50	20
WS 1.2.1	Water Quality Data Collection and Analysis	50:50	70
WS 1.2.2	Sources and Effluents Inventory	0:100	20
WS 1.3.1	Fisheries Investigation - Mackay River	50:50	95
WS 1.3.2	Aquatic Biological Investigations-Muskeg River	50:50	102
WS 1.5.1	Aquatic Habitat Investigations - Athabasca River	50:50	20
WS 1.5.2	Synthesis of Fisheries Investigations - Athabasca River	50:50	20
WS 1.6.1	Fisheries Investigation - Southern Study Area - Spring Spawners	25:75	30
WS 1.6.2	Fisheries Investigation - Southern Study Area - Tributary System	25:75	40
WS 2.1	Lake Acidification - Heavy Metals Cycling	100:0	50
WS 2.2	Hydrogeological Investigations - Muskeg River	0:100	20
WS 2.2.1	Hydrogeological Investigations - AOSERP Study Area	0:100	-
WS 2.3	Assimilative Capacity of the Athabasca River	50:50	40
WS 2.6	Aquatic Toxicological Research	75:25	120
WS 3.3	Mixing Studies - Athabasca River and Delta	50:50	35
WS 3.4	Aquatic Habitat Mapping	50:50	15
WS 3.5	Biomonitoring in the Water System	50:50	23
WS 4.1	Recolonization of Streams by Aquatic Organisms	50:50	10
WS 4.1.1	Degregation and Assimilation of Bitumen by Microorganisms and Macrobenthos	50:50	10
	TOTAL		850

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 110,000
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 1.1 (HY 1.1, HY 1.3)	DURATION: 5 years STATUS: 4 of 5 years

TITLE. Hydrometric and Suspended Sediment Data Collection in the AOSERP Study Area

OBJECTIVES:

1. To provide adequate streamflow information for an inventory of hydrology resources for the AOSERP study area to be used in water quantity-quality, water use, floodflow and modelling studies.
2. To provide background information on the termporal distribution of suspended sediment concentrations and discharges in streams within the AOSERP study area.

RESEARCH OUTLINE:

1. Monthly discharge measurements will be made at defined streamflow and lake level stations.
2. More frequent measurements at streamflow stations will be made during spring break-up to define backwater conditions and during rainstorm events to define and monitor stage-discharge relationships.
3. Suspended sediment samples will be collected at defined locations and intervals within the AOSERP study area.
4. Water samples for water quality analysis will be collected by project personnel for separate water system projects.
5. Interim data reports will be provided on hydrometric and suspended sediments aspects of the project.

PROJECT TO BE UNDERTAKEN BY:

Water Survey of Canada

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 20,000
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 1.1.1	DURATION: 6 months STATUS: new

TITLE: Synthesis and Analysis of Hydrometric and Suspended Sediment Data Collected from the AOSERP Study Area.

OBJECTIVES:

To obtain an understanding of the hydraulic and hydrologic processes occurring in the study area.

RESEARCH OUTLINE:

1. Review all hydrometric and suspended sediment data collected in the AOSERP study area.
2. Analyse and report on the processes in the hydrological cycle. Interactions between atmospheric, surface and groundwater will be included where appropriate.

PROJECT TO BE UNDERTAKEN BY:

Consultant - to be defined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 2 March 78

J.P. Bruce, Member for Canada — Date: 10 March 78

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 70,000
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 1.2.1 (HY 2.8.1)	DURATION: 3 years STATUS: 2 of 3 years

TITLE: Water Quality Data Collection and Analysis from the AOSERP Study Area

OBJECTIVES:

To obtain an initial understanding of the natural water quality loadings and processes in the AOSERP study area and establish baseline conditions of water quality for current and future studies.

RESEARCH OUTLINE:

1. Identify significant naturally occurring water quality parameters which should be included in procedures for predicting water quality.
2. Provide data on the variation of water quality parameters over time at the mouths of important stream basins which will be used by future studies to confirm the general accuracy of calibrated water quality models through a comparison of predicted and measured water quality levels.
3. Provide regional baseline water quality data for the Athabasca River system (including mainstem, tributaries, delta and lakes) for the AOSERP study area.
4. To provide water quality information and support for concurrent studies.

PROJECT TO BE UNDERTAKEN BY:

Alberta Environment. Pollution Control Division.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 20,000
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 0 : 100
PROJECT NO: WS 1.2.2 (HY 4.2)	DURATION: 2 years STATUS: 2nd of 2nd year

TITLE:
Regional Inventory of Natural Water Quality Conditions and Oil Sands Development Effluents and Water Use Requirements.

OBJECTIVES:

1. Compile all available chemical and physical characteristics and geographic locations of sources of natural and non-natural inputs to the surface water system of the AOSERP study area.
2. Review published information on data management systems and recommend a system appropriate to the needs of AOSERP and other user groups.

   After consultation with AOSER Program Management, adopt an appropriate system for use in providing statistical summaries of natural and wastewater quality/ quantity and use requirements.

RESEARCH OUTLINE:

1. Compile all available water quality/quantity information on water use requirements and wastewater discharges which could affect the surface water system of the AOSERP study area.
2. Compile all available natural(baseline)water quality/quantity information from the AOSERP study area.
3. Enter all data on water use and wastewater characteristics in NAQUADAT or more appropriate system.
4. Provide data summaries of wastewaters and water uses/or levels of development as well as a range of environmental conditions.
5. Provide data summaries of natural flow and water quality regime in the AOSERP study area.

PROJECT TO BE UNDERTAKEN BY:

Consultant - to be defined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Sołodzak, Chairman — 2 March 78 Date

J.F. Bruce, Member for Canada — 10/3/78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 95,000
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 1.3.1	DURATION: 1 Year , STATUS: New

TITLE:

Aquatic Biological Investigation of the MacKay River Watershed

OBJECTIVES:

1. To describe earlier states of the fish component of the aquatic ecosystem in the MacKay River watershed as bounded the AOSERP study area.
2. To describe, in detail, the aquatic habitat in the MacKay River watershed.
3. To provide an estimate of the significance of the fish population utilizing the MacKay River watershed to the Athabasca River System.
4. To describe the food habits and predator-prey relationships of major fish species utilizing the MacKay River watersheds.

RESEARCH OUTLINE:

1. Describe the biology, species composition, relative abundance, age, growth, food habits, sex ratio, fecundity of the fish populations utilizing the MacKay River watershed. Studies will include: enumerating adult fish population, describing the timing of seasonal and daily movements of migrant fish population, and monitoring downstream movements of the fry of the major species.
2. Utilizing the aquatic habitat classification system and key adopted by AOSERP describe, in detail, the aquatic habitat of the MacKay River watershed and produce a set of aquatic habitat maps (1:50,000).
3. Provision of fish standard samples and "kick" samples from stations established in the MacKay River watershed to project WS 1.3.2 personnel for identification and analysis.
4. Provision of fisheries expertise to project WS 1.3.2 personnel in completing the description of the aquatic habitat of the Muskeg River watershed.

PROJECT TO BE UNDERTAKEN BY:

Fisheries and Marine Services, Freshwater Institute, Winnipeg

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 78 Date

J.E. Bruce, Member for Canada — 10 March 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 102,000
CORE ACTIVITY: Baseline States 50% Applied Research 50%	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 1.3.2	DURATION: 2 years STATUS: 2 of 2

TITLE: Aquatic Biological Investigations of the Muskeg River Watershed

OBJECTIVES:

1. To complete the description of the baseline states of the fish, aquatic invertebrate, algal and bacterial components of the aquatic ecosystem in the Muskeg River watershed.
2. To complete a detailed description of the aquatic habitat in the Muskeg River System.
3. To provide an estimate of the significance of the Muskeg River Watershed to the Athabasca River System.
4. To develop a simple qualitative biological "box" model of the Muskeg River Watershed that includes energy flow, nutrient cycling and predator-prey relationships.

RESEARCH OUTLINE:

1. Describe the biology, including life cycles, species composition, temporal and spatial changes in species, numbers and relative abundance and biomass of major aquatic invertebrate species of the Muskeg River Watershed. Studies will include: the species composition, biomass and variation of aquatic invertebrates drift and the the importance of aquatic invertebrates as prey items.
2. Identify the nature and abundance of microbial tana of the Muskeg River basin. Studies will determine the temporal and spatial distribution, numbers, relative abundance and biomass of primary and secondary microbial producers in water and stream sedimentation.
3. Utilizing the aquatic habitat classification system and key adopted by AOSERP, describe, in detail, the aquatic habitat of the Muskeg River watershed and produce a set of maps (1:50,000) depicting the aquatic habitat of this watershed.
4. A sample qualitative biological "box" model of the Muskeg River watershed utilizing data collected as part of this and previous studies was well as that from published literature.

PROJECT TO BE UNDERTAKEN BY:

Fisheries and Marine Services, Freshwater Institute, Winnipeg

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 24 March 78 Date

for J.P. Bruce, Member for Canada — 10 May 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: WATER	1978-79 BUDGET: 9,600
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 1.4 (AF 2.5.1)	DURATION: 3 months STATUS: Extention

TITLE: Ecology and Life Cycles of Aquatic Invertebrates in Hartley Creek (formerly AF 2.5.1)

OBJECTIVES: PART A. - Life Cycle Studies

1. To identify the aquatic invertebrate species of Hartley Creek.
2. To determine the temporal and spatial distribution and abundance of the principal aquatic invertebrate species of Hartley Creek.
3. To determine the life-cycles of the principal aquatic invertebrate species in Hartley Creek.
4. To determine the species composition, significance and variability of aquatic invertebrate drift in Hartley Creek on a diel and seasonal basis.

PART B. - Community Studies

1. To define, quantitatively, the aquatic invertebrate community structure of pools and riffles in Hartley Creek.
2. To determine the microdistribution of the principle aquatic invertebrates of each community.
3. To define, quantitatively, the principal aquatic invertebrates as components of the communities.
4. To define and assess the principal interactions between these components of the community and the effects of primary environmental factors.

RESEARCH OUTLINE:

All field work has been completed. An extention of time has been required so that all laboratory work and data analysis could be finished. The methodology employed previously will be continued.

PROJECT TO BE UNDERTAKEN BY:

University of Calgary

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman ..... Date ..... J.P. Bruce, Member for Canada ..... Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 20,000
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 1.5.1	DURATION: 6 months, STATUS: New

TITLE:

Aquatic Habitat Description and Mapping of the Athabasca River and Delta in the AOSERP Study Area

OBJECTIVES:

To describe and map the aquatic habitat of the Athabasca River and Delta as well as the Clearwater River within the AOSERP study area.

RESEARCH OUTLINE:

1. Using the aquatic habitat classification system and key adopted by AOSERP describe, in detail, the aquatic habitat at fish and invertebrate sampling stations established by previous and ongoing studies on the Athabasca River and Delta as well as the Clearwater River within the AOSERP study area.
2. Provide a set of maps (1:50,000) depicting the aquatic habitat of the Athabasca River and Delta as well as the Clearwater River within the AOSERP study area.

PROJECT TO BE UNDERTAKEN BY:

Consultant

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 24 Nov 78 Date

J.P. Bruce, Member for Canada — 10 Nov 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 20,000
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 1.5.2	DURATION: 6 Months STATUS: new

TITLE:

Synthesis of Aquatic Habitat and Aquatic Biological Investigations from the Main Stem Athabasca and Clearwater Rivers in the AOSERP Study Area.

OBJECTIVES:

To synthesize and report on aquatic biological investigations and the aquatic habitat in the main stem Athabasca and Clearwater rivers in the AOSERP study area.

RESEARCH OUTLINE:

1. Review all information, data and reports from previous and ongoing studies in the AOSERP study area pertaining to aquatic biological investigations on the main stem Athabascaand Clearwater rivers.
2. Produce a synthesis (for publication) of the aquatic biological investigations and the aquatic habitat in the main stem Athabasca and Clearwater rivers in the AOSERP study area.
3. Identify gaps in the data base and outline research projects designed to fill the deficiencies.

PROJECT TO BE UNDERTAKEN BY:

Consultant

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 78 Date

for J.P. Bruce, Member for Canada — 10 Mar 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 30,000
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 25 : 75
PROJECT NO: WS 1.6.1	DURATION: 6 months STATUS: New

TITLE: Investigations of the Spring Spawning Fish Populations in the Athabasca and Clearwater Rivers Upstream from Fort McMurray.

OBJECTIVES:

To describe the biology of the major spring spawning fish populations in the Athabasca and Clearwater rivers upstream from Fort McMurray within the AOSERP study area.

RESEARCH OUTLINE:

1. Review and report on the literature pertaining to the spawning activities of the major spring spawning fish populations in the Athabasca and Clearwater rivers within the AOSERP study area.
2. Determine the species composition, relative abundance and biology of the major fish species in the Athabasca and Clearwater rivers upstream from Fort McMurray to the southern boundary of the AOSERP study area during the period of study (pike, walleye, grayling, sucker, whitefish, goldeye).
3. Delineate actual and potential spawning areas by species in the Athabasca and Clearwater rivers as well as in tributary streams entering these rivers upstream from Fort McMurray.
4. Monitor development of eggs in relation to environmental conditions by underwater sampling and observations.
5. Monitor the downstream movements of fry including lake whitefish spawned during the fall of 1977.

PROJECT TO BE UNDERTAKEN BY:

Aquatic Environments, Ltd

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 Mar 78 Date

P. Brucc, Member for Canada — 10 Mar 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 40,000
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 1.6.2	DURATION: 2 years STATUS: New

TITLE:

Aquatic Biological Investigations in the Southern Portion of the AOSERP Study Area

OBJECTIVES:

1. To describe the baseline states of the major components of the aquatic ecosystems in the southern portion of the AOSERP study area.
2. To provide a quantitative estimate of the significance of the watersheds in the southern portion of the AOSERP study area to Athabasca River system.
3. To describe, in detail, aquatic habitat of streams in the southern portion of the AOSERP study area as bounded by the Athabasca and Clearwater rivers.

RESEARCH OUTLINE:

In conjunction with and subsequent to the execution of project WS 1.6.1:

1. Undertake a munimum of two (spring and fall) reconnaissance surveys of streams tributary to the Athabasca and Clearwater rivers in the southern portion of the AOSERP study area.
2. Delineate actual and potential spawning areas by species in the streams.
3. Determine species compositon and relative abundance of fish species utilizing these tributary streams.
4. Collect "kick" samples and fish stomach contents from stations established in tributary streams to project WS 1.3.2 personnel for identification and analysis.
5. Using the aquatic habitat classification system and key adopted by AOSERP describe, in detail, the aquatic habitat of tributary streams surveyed and produce a set of maps (1:50,000) depicting the aquatic habitat of the tributary streams.

PROJECT TO BE UNDERTAKEN BY:

Aquatic Environments, Ltd.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 2 March 78

J.P. Bruce, Member for Canada — Date: Feb 28

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 50,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 100:0
PROJECT NO: WS 2.1 (AF 2.3.1)	DURATION: 5 years STATUS: 3 of 5 years

TITLE: Studies on Acidification and Cycling of Heavy Metals in Aquatic Ecosystems

OBJECTIVES:

To assess the effects of lowering pH on lake productivity, fish physiology and toxicity as will as heavy metal mobilization.

To relate processes discovered to lakes in the AOSERP study area.

RESEARCH OUTLINE:

1. Lower the pH of lake 223 in the Experimental Lakes Area, Kenora, o.5 pH unit to pH 5.0 and maintain at that level through addition of H_2SO_4.
2. Studies will be carried out in 1978-79 on changes in: phytoplankton, phytobenthos, zooplankton and zoobenthos species composition, standing crop and production; mortality, growth rates, diet (fecundity and egg mortality) of fish populations; as well as Ca metabolism of fish populations and effects of acid in mobilization of nutrients and jamor ions and trace elements.
3. Large limnocorals will be maintained in both experimental and control lakes for conducting heavy metal experiments. Biological effects of several combinations of pH and heavy metals will be examined.

It is recommended that this project procede only after a detailed analysis of its relevance to the AOSERP area is accomplished

PROJECT TO BE UNDERTAKEN BY:

Fisheries Canada, Fisheries and Marine Service, Freshwater Institute, Winnipeg.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 78 Date

J.P. Bruce, Member for Canada — 13 Mar 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 20,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 0 : 100
PROJECT NO: WS 2.2 (HG 1.1)	DURATION: 3 years STATUS: 3 of 3 years

TITLE:
Hydrogeological Investigation of the Muskeg River Basin

OBJECTIVES:

To complete the detailed description of the groundwater regime of the Muskeg River watershed and relate this system to other muskegs in the AOSERP study area.

RESEARCH OUTLINE:

1. Collect and interpret existing hydrogeological data for the Muskeg River basin.
2. Collect and interpret hydrogeological date that may be eaily obtainable for the watershed.
3. Evaluate the role of muskeg in the groundwater regime.
4. Interpret chemical and streamflow parameters collected at the basin outlet and relate to features of the groundwater system.
5. Develop groundwater models capable of providing the means to study the characteristics of shallow, near-stream groundwater systems.

PROJECT TO BE UNDERTAKEN BY:

University of Alberta

PROJECT APPROVED BY STEERING COMMITTEE:

W. Sololoziuk, Chairman — 2 March 1978 Date

J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: N/A
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 0 : 100
PROJECT NO: WS 2.2.1	DURATION: STATUS: New

TITLE:

Hydrogeological Investigations - AOSERP Study Area

OBJECTIVES:

Several concerns have been expressed by the Water System Scientific Advisory Committee over how the role of regional ground water will be changed by oil sands development. Areas that to date have been pointed toward as important research concerns are:

1) Detailed relationship of ground water to surface water
2) Possible effects of tailings ponds on ground water
3) Effects of in-situ operations on ground water
4) Hydraulic role of a hypothesized fault traversing the area

RESEARCH OUTLINE:

Specific projects will be started as priorities are assigned to the above concerns. An upcoming publication of the regional ground water situation by the Alberta Research Council will assist in this.

Most likely regional and/or in-situ monitoring will comprise the initial thrust.

PROJECT TO BE UNDERTAKEN BY:

ALberta Research Council

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 13 April 78 Date

J.P. Bruce, Member for Canada — 13 April 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 40,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 2.3 (AF 2.6.1)	DURATION: 2 years STATUS: 2 of 2 years

TITLE:
Assimilative Capacity of the Athabasca River Due to Microbial Degregation of Organic Compounds

OBJECTIVES:

General- To develop a biological model of the Athabasca River System that includes the rates of nutrient uptake, to use this model to determine the capacity of microbes to remove organic compounds and to predict the effects of oil sands development activities in the Athabasca River.
Specific- (Year 1) 1. To produce a thorough and definitive review of the literature on the assimilative capacity of river systems due to microbial degration of organic compounds and methods for the measurement of nutrient uptake by microbial population.
2. To determine total numbers and define physiological groups of microbes along the Athabasca River system on a seasonal basis (objective for year 2 to be defined by September 1978).

RESEARCH OUTLINE:
1. The literature relative to the assimilative capacity of river systems due to microbial degregation of organic compounds will be reviewed.
2. The literature relative to methods for measurement of nutrient uptake by microbial populations will be reviewed.
3. On the basis of 1 and 2 the Athabasca River system, the current state of knowledge on assimilative capacity of river systems, and defieiencies in knowledge base will be defined, methods to measure nutrient uptake will be selected or adapted, and an annotated bibliography will be produced.
4. A field dampling and measurement program appropriate to the determination of total microbial numbers and physiological groups upstream from the Athabasca Oil Sands deposit and to determine the effects of passage through this formation on a seasonal basis.
5. An interim report will be submitted on year one of the project.

PROJECT TO BE UNDERTAKEN BY:

Chemical and Geological Laboratories

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 120,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 2.6	DURATION: 2 years STATUS: New

TITLE: Aquatic Toxicological Research (Individual to be defined)

OBJECTIVES:

The toxicology research program is presently in the pre-design stage and another contract has been let to a consultant in order to obtain an unbiased, integrated package of toxicological research for the Program. Toxicological research projects to be undertaken in 1978-79 and in future years will be dependent upon the outcome of this report. Therefore no research details have been worked out at this time. However, a preliminary report from this design project has suggested that the long term toxicity of whole saline water is of concern and we are starting to design a tentative project in this area.

RESEARCH OUTLINE:

1. "Long Term Toxicology Studies of While Saline Water." (tentative) Freshwater Institute, Winnipeg suggested agency.

2. Other Projects as recommended by design study.

PROJECT TO BE UNDERTAKEN BY:

To be defined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 Mar 78 Date

P. Bruce, Member for Canada — 10 Mar 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 35,000
CORE ACTIVITY: Research adn Development Monitoring	FEDERAL-PROVINCIAL INTEREST RATIO: 50 :50
PROJECT NO: WS 3.3 (HY 1.4)	DURATION: 2 years STATUS: 2nd of 2 years

TITLE:

Mixing Studies - Athabasca River and Delta

OBJECTIVES:

1. Review the literature and document the capabilities of existing procedures for predicting the concentrations of natural effluent loadings in river systems.
2. Explore the feasibility of modelling the pathways of materials transported by the Athabasca River into the Peace-Athabasca Delta system.
3. Assess the ability of the Athabasca River in the AOSERP study area to mix point source effluent stream under ice conditions through the calibration and utilization of an existing model.

RESEARCH OUTLINE:

1. Review the literature on wide channel mixing models and document the progress on the calibration and validation of a mixing model for stretches of the Athabasca River in the AOSERP study area.
2. Evaluate alternative models and design a plan to calibrate and validate a flexible, extendable modelling procedure for predicting the pathways of materials including oil spills transported by the Athabasca River into the Peace-Athabasca Delta system.
3. Develop a procedure and utilize it to determine the mixing characteristics of a selected stretch of the Athabasca River in the AOSERP study area over a range of winter flow conditions for effluents when differential density is not a factor.
4. Estimate the mixing characteristics of all sections of the Athabasca River in the AOSERP study area including time of travel, longitudinal and transverse mixing under a representative range of winter flow conditions when differential density is a factor.

PROJECT TO BE UNDERTAKEN BY:

To be defined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water CORE ACTIVITY: Research and Development Monitoring PROJECT NO: WS 3.4	1978-79 BUDGET: 15, 000 FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50 DURATION: 1 year STATUS: new

TITLE: Aquatic Habitat Mapping of the AOSERP study area

OBJECTIVES:

To obtain a set of maps at a scale of 1:50,000 for the AOSERP study area illustrating and describing the major aquatic habitat types.

RESEARCH OUTLINE:

Terms of reference will be defined based on the outcome of a contract let to a consulting firm in 1977-78 to prepare a parameter list that will facilitate characterization of the aquatic habitat of the AOSERP study area.

The parameter list will be provided to AOSERP researchers in the field for the purpose of describing the aquatic habitat in a meaningfull, uniform and desired format. The maps will incorporate date from previous and ongoing studies.

It is intended that this project be coordinated with, if not placed under "Phase II - Ecological Habitat Mapping of the AOSERP Study Area".

PROJECT TO BE UNDERTAKEN BY:

Consultant - to be defined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 (Date)

J.F. Bruce, Member for Canada — 2 March 1978 (Date)

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 23, 000
CORE ACTIVITY: Research and Development Monitoring	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 3.5	DURATION: 1 year STATUS: Unsolicited Proposal

TITLE: Biomonitoring in the Water System within the AOSERP Study Area

OBJECTIVES:

To define precise techniques and to establish a sampling program which could be conducted over a period of years:

1. to describe year-to-year variations in the characteristics of aquatic biota in the water systems of the AOSERP study area.
2. to determine whether there are long term trends which might be related to the effects of development; and if so,
3. to locate sources of pollutants which might be having direct effects on water quality in the water systems.

RESEARCH OUTLINE:

1. Review the published literature with respect to biomonitoring in aquatic systems and provide an annotated bibliography.
2. On the basis of the review, select several appropriate biomonitoring techniques indicator organisms, methodologies(e.g. exposure period) and undertake a series of experiments to evaluate alternatives and recommend the selection of biomonitoring techniques appropriate to water systems of the AOSERP study area.
3. Develop a program for the computer storage and recall of all relevant biomonitoring data.
4. Provide estimates of costs and manpower for the biomonitoring program recommended for the AOSERP study area as well as the storage-retrieval system.

PROJECT TO BE UNDERTAKEN BY:

Consultant - to be defined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 21 March 78 Date

J.P. Bruce, Member for Canada — 10 March 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 10,000
CORE ACTIVITY: Researched Development Restoration	FEDERAL-PROVINCIAL INTEREST RATIO: 50: 50
PROJECT NO: WS 4.1	DURATION: 2 years STATUS: New

TITLE: Studies in Recolonization of Stream Substrates by Aquatic Organisms.

OBJECTIVES:

To experimentally evaluate the ability of bacteria, algae and aquatic invertebrates to recolonize various types of stream substrates under a variety of environmental conditions in the AOSERP study area.

To evaluate methods of stream substrate restoration that may be employed through stream diversion and reclamation activities relative to oil sands development.

RESEARCH OUTLINE:

Review the literature with respect to stream diversion and restoration techniques and associated effects on aquatic biota is being done under a separate contract in 1977-78 and will be available before commencement of this project.

1. Design and undertake a series of field experiments appropriate to the objectives of the study. Experiments will be carried out during the four seasons of the year.
2. Provide quantitative estimates of the ability of bacteria, algae and aquatic invertebrate populations to recolonize various stream substrates under a variety of environmental conditions.
3. Evaluate present and proposed methods with respect to stream diversion and restoration techniques and, on the basis of experimental results, recommend appropriate methods to promote the recolonization of stream substrates by stable and productive aquatic biological communities.

PROJECT TO BE UNDERTAKEN BY:

To be defined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 (Date)

for J.P. Bruce, Member for Canada — 2 March 1978 (Date)

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Water	1978-79 BUDGET: 10,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: WS 4.1.1	DURATION: 1 year STATUS: new

TITLE: Ability of lotic microorganisms and Macrobenthos to Degrade and Assimilate Bitumen.

OBJECTIVES:

1. To evaluate the ability of lotic microorganisms and macrobenthos in the oil sands area to degrade and assimilate hydrocarbons which occur naturally and hydrocarbons which may be discharged into waters in the oil sands area.
2. To evaluate the overall ability of brown-water rivers to assimilate organic loadings.

RESEARCH OUTLINE:

1. Measure the responses by microbial, algal and invertebrate populations to various hydrocarbon impregnated materials in the field under appropriate habitat considerations such as ligh, temperature, flow, etc.
2. Measure degredation rates of various hydrocarbons by indigenous organisms in the laboratory under conditions that are related to actual field conditions.

PROJECT TO BE UNDERTAKEN BY:

Fisheries and Marine Service, Freshwater Institute, Winnipeg.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 Nov 78 Date

J.P. Bruce, Member for Canada — 10 Nov 78 Date

CANADA - ALBERTA

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

SYSTEM AUTHORIZATION: Land System

DESCRIPTION:

Land System research is designed to describe the baseline states of terrestrial ecosystems of the study area and to quantify, predict and verify physical, chemical and biological changes in those ecosystems resulting from oil sands development. Objectives of Land System research will be to identify reclamation methods which will be useful in restoring productivity to disturbed areas, to identify other areas which may be enhanced as mitigation measures and to develop methods for biomonitoring and protecting systems in undeveloped portions of this study area.

Research is the Land System has included studies in the areas of Vegetation, Terrestrial Fauna and Land Use. The general strategy has been to describe the baseline states of terrestrial ecosystems in the study area with the view towards applied research dominating the research effort in years four and five of the Program. Baseline studies have included vegetation, soils and terrestrial biological studies on a regional basis as well as intensive studies on rare and endangered species on a site-specific basis. Research has been carried out on suitable tree, shrub and grass species for oil sands reclamation activities as well as the possible effects of SO_2 on plants under field and laboratory conditions.

ESTIMATED BUDGET ($K):

FISCAL YEAR	APPROXIMATE BUDGET	SHARE	
		CANADA	ALBERTA
1975-76	1,364	286	1,078
1976-77	1,956	656	1,299
1977-78	1,286	412	874
1978-79	1,500	703.75	796.25
1979-80	1,650	528	1,122
TOTAL	7,756	2585.75	5,169.25

APPROVAL:

The following budget is approved for the 1978-79 fiscal year:

CANADA 703.75 ALBERTA 796.25

APPROVED FOR ALBERTA

for MINISTER

2 March 78
Date

APPROVED FOR CANADA:

MINISTER

March 9, 1978
Date

AOSERP

1978-79 BUDGET SUMMARY BY PROJECT ($K)

SYSTEM: LAND

PROJECT NO.	TITLE	FEDERAL-PROVINCIAL INTEREST RATIO	BUDGET ALLOCATION
LS 2.1	Soils Inventory of the AOSERP Study Area	0:100	75
LS 2.3.1	Ecological Habitat Mapping - Phase I	50:50	80
LS 2.3.2	Ecological Habitat Mapping in the AOSERP Study Area	50:50	100
LS 3.1	Symptomology and Threshold Levels - Effects of SO_2	75:25	65
LS 3.3	Physiology and Mechanisms - Effects of SO_2	75:25	60
LS 3.4	Ecological Benchmarking and Biomonitoring	75:25	55
LS 4.1	Soils Research Related to Revegetation	50:50	5
LS 4.2	Soil Changes Induced by Sulphur-I	50:50	5
LS 4.3	Soil Changes Induced by Sulphur-II	50:50	50
LS 4.4	Soil Chemical and Physical Properties	50:50	75
LS 5.2	Characterization and Utilization of Peat	0:100	90
LS 7.1	Reclamation Afforestation by Trees and Shrubs	50:50	90
LS 7.1.1	Control of Small Mammals - Reclamation	50:50	30
LS 7.1.2	Baseline States of Small Mammals	50:50	40
LS 7.2	Tests of Native Species for Reclamation	50:50	45
LS 7.6	Reclamation Review	0:100	35
LS 9.1	Reinstatement of Biological Activity-Soils	50:50	60
LS 10.1	Synecology and Autecology of the Boreal Forest	25:75	110
LS 10.2	Inventory of Aquatic Macrophytes	50:50	20
LS 11.1	Establishment of Long-Term Biomonitoring Plots	50:50	40
LS 12.1	Oil Sands Development and Reclamation Model Study	0:100	-
LS 21.6	Moose, Wolf, Caribou and Bear - Habitat Utilization and Requirements	0:100	35
LS 22.1	Baseline States of Avifauna - AOSERP Study Area	75:25	40
LS 22.2	Rare and Sensitive Species - White Pelicans	75:25	40
LS 22.3	Baseline States of Rare Sensitive Species	75:25	30
LS 23.1	Semi-Aquatic Mammals - Baseline States	25:75	55
LS 28.1	Insect Fauna of the AOSERP Study Area	50:50	80
LS 29.1	Baseline Levels of Contaminants in Birds and Mammals	75:25	90
	TOTAL		1,500

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $75,000
CORE ACTIVITY: Baseline States of Terrestrial Ecosystems	FEDERAL-PROVINCIAL INTEREST RATIO: 0 : 100
PROJECT NO: LS 2.1	DURATION: 4 years STATUS: 3 of 4

TITLE: Soils Inventory of the Oil Sands Area

OBJECTIVES:

The purpose is to provide baseline data with respect to the location and extent of soils and landforms in the study area.

The project will:

1. Provide soils and geomorphological maps of identified high priority portions of the study area at a scale of 1:50,000 for field working area.
2. Provide land systems maps of the study area at a scale of 1:250,000 with an attendent key.
3. Provide Program Management with copies of the field working maps as maps are completed.

RESEARCH OUTLINE:

The biophysical land classification system is being utilized in the mapping of the area. This system relies on the use of aerial photographs and air photo interpretation techniques combined with supporting field checking. Emphasis will be placed on the classification and mapping of certain patterns of soils, landforms, and vegetation.

An open-ended legend has been prepared for mapping in the area and work will consist of following the legend with expansion as necessary.

The work is being fully coordinated with LS 2.3, Ecological Habitat Mapping of the oil sands area.

Areas of emphasis for the 1978-79 fiscal year are the area south from that completed to the southern boundary of the study area, and the Birch Mountain lakes areas.

PROJECT TO BE UNDERTAKEN BY:

Research Council of Alberta - Soils Division - J.D. Lindsay

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $80,000
CORE ACTIVITY: Baseline States of Terrestrial Ecosystems	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: LS 2.3.1	DURATION: 2 years STATUS: 2nd of 2 years

TITLE: Ecological Habitat Mapping of the AOSERP Study Area: Phase I

OBJECTIVES:

1. Identify and map major terrestrial and aquatic vegetation associations for later in-depth habitat and successional analysis.
2. Develop mapping correlations between habitat characteristics and existing multiband imagry of the study area.
3. Identify and map major landforms, surficial geologic features, water bodies, and stream courses.

RESEARCH OUTLINE:

Monocolor maps at 1:50,000 scale will be prepared for the portion of the study area not covered by the 1977-78 contract. All details of the 1977-78 work plan will be followed to project completion. The necessary aerial photography to complete coverage of the study area while vegetation is in foliage will be flown. Limited ground truthing will be done as necessary.

PROJECT TO BE UNDERTAKEN BY:
Intera Environmental Consultants Limited

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $100,000
CORE ACTIVITY: Applied Research Effects on Terrestrial Ecosystems	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: LS 2.3.2	DURATION: 3 years, STATUS: 1 of 3

TITLE: Ecological Habitat Mapping of the AOSERP Study Area. Phase II

OBJECTIVES:

1. To refine the static descriptions of the habitat types developed in Phase I.
2. To develop an understanding of the dynamics of these types, including the historical predictive, and consumer biota utilization.
3. To initiate (2) above on areas of defined high priority.

RESEARCH OUTLINE:

Several sub-projects will be conducted under separate terms of reference. Preparation of evaluation maps for program use may require additional photography and will require more intensive ground truthing than was possible under the Phase I contract.

Successional analysis of defined habitat types will be initiated to determine the dynamics of ecosystem development and organism interactions. This will aid construction of a reclamation model to minimize long term energy inputs, as well as provide the baseline information on processes that will be needed to evaluate successional progression as reflecting response to development as contrasted to that which would occur naturally.

Because of the variety of habitats present in the study area (ten is a conservative estimate) the specialized expertise of many individuals will be required. This will probably require that several consultants will be required on separate contracts.

PROJECT TO BE UNDERTAKEN BY:

Consultants

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman _____ Date

J.P. Bruce, Member for Canada _____ Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $65,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: LS 3.1	DURATION: 5 years STATUS: 4th year

TITLE: Symptomology and Threshold Levels of Air Pollutant Injury to Vegetation

OBJECTIVES:

1. Determine in quantitative terms the threshold levels of visual and previsual symptoms of injury to native vegetation in the AOSERP study area.
2. Aid in identifying native and exotic reclamation species with innate resistance to air pollutants.
3. Aid in the development of a simple field test for previsual and visual symptoms of effluents damage to vegetation.
4. Aid in determination of recovery mechanisms from sub-lethal effluent exposure of vegetation, as well as residual effects on growth and development of vegetation.

RESEARCH OUTLINE:

Plant materials which have potential for reclamation, and other plants which may be subjected to fumigation by effluents resulting from oil sands development will be tested under controlled conditions. The testing will allow identification of changes in appearance and physiological condition to be related to known levels of effluent exposure. This will lead directly to the ability to evaluate effluent impacts on native vegetation for different levels of air pollution, and will aid in selection of vegetation for use in reclamation of high exposure areas.

PROJECT TO BE UNDERTAKEN BY:
Environment Canada - Canadian Forestry Service (Northern Forest Research Centre)

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 78 Date

J.P. Bruce, Member for Canada — 10 Mar 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $60,000
CORE ACTIVITY: Research and Development	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: LS 3.3	DURATION: 5 years STATUS: 4th year

TITLE: Physiology and Mechanisms of Air-Borne Pollutant Injury

OBJECTIVES:

1. Determination of the physiological response to vegetation to controlled exposures to aerial pollutants singly and in combinations.

2. Development of operational techniques for detecting and diagnosing impacts of aerial effluents, singly and in combination, prior to the appearance of visual symptoms.

RESEARCH OUTLINE:

The major effort of this project will be to determine the physiological responses of native vegetation to exposure to controlled dosages of air pollutants. Physiological changes are indicated by biochemical changes in plants, and these biochemical changes can be documented and quantified within reasonable limits of statistical reliability. From a knowledge of the biochemical indicators of physiological stress, work can proceed to development of reliable field and laboratory tests to determine the significance of impingement of air pollutants on the vegetation.

PROJECT TO BE UNDERTAKEN BY:
Environment Canada - Canadian Forestry Service (Northern Forest Research Centre)

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 78 Date

for J.R. Bruce, Member for Canada — 10 Mar 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $55,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: LS 3.4	DURATION: 5 years STATUS: 4th year

TITLE: Ecological Benchmarking and Biomonitoring for Detection of Airborne Pollutant Effects on Vegetation and Soils

OBJECTIVES:

1. Evaluate the effects of airborne pollutants on the structure and composition of native vegetational communities.
2. Relate changes in community structure to the differential physiological responses of species as studied in LS 3.1 and LS 3.3.
3. Document the baseline levels of potentially hazardous air pollutants in vegetation in the AOSERP study area.

RESEARCH OUTLINE:

The project will continue to monitor the existing plot network, and cooperate with LS 11.1 in the establishment of these plots as part of Alberta Forest Service's Permanent Sample Plots system. Since the existing sample plots are restricted to communities dominated by jack pine and black spruce, a major effort in this and following years will be aimed towards expanding the network to include additional habitat types as identified in projects LS 2.3.1 and LS 2.3.2

PROJECT TO BE UNDERTAKEN BY:

Environment Canada - Canadian Forestry Service (Northern Forest Research Centre)

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 78 Date

J.P. Bruce, Member for Canada — 10 Mar 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $5,000
CORE ACTIVITY: Baseline	FEDERAL-PROVINCIAL INTEREST RATIO: 50 :50
PROJECT NO: LS 4.1	DURATION: 4 years STATUS: 4th year

TITLE: Soils Research Related to the Revegetation of the Oil Sands Area - Report Preparation

OBJECTIVES:

The purpose of this project is to provide basic soils data on disturbed and undisturbed sites in the oil sands area for use in developing sound management programs to ensure successful revegetation of spoil piles, tailings sand piles, etc., and to develop methods of improving soil factors.

RESEARCH OUTLINE:

The work this year will be devoted to writing up a final report on progress in the following areas of investigation.

1. Examining the probability of the success of clay lenses to develop perched water tables in tailings sand.
2. Examining the chemical, physical and microbiological properties of tailings sand, tailings sand with peat amendments, overburden, overburden and tailing sand mixtures, and overburden, tailings sand and peat mixtures.
3. Examining control areas to determine the baseline of soil characteristics.
4. Examining nutrient cycling in fertilized and unfertilized soils and soil mixtures as outlined in (2) above.

PROJECT TO BE UNDERTAKEN BY:

University of Alberta Soil Science

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $5,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: LS 4.2	DURATION: 4 years STATUS: 4th year

TITLE: The Rate and Extent of Soil Changes Induced by Sulphur in the Oil Sands Area

OBJECTIVES:

1. Determine the mechanism and rate of SO_2 uptake by soils.
2. Find the effect that this has on soil pH, available sulphur and biological activity.
3. Determine the extent of SO_2 damage to soils.
4. Study countermeasures against this damage.

RESEARCH OUTLINE:

The work this year is to complete laboratory analyses of samples, clean up field sites, and prepare a final project report.

PROJECT TO BE UNDERTAKEN BY:

University of Alberta, Department of Soil Science (Dr. Nyborg)

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND CORE ACTIVITY: Applied Research - Effect on Terrestrial Ecosystems PROJECT NO: LS 4.3	1978-79 BUDGET: $50,000 FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50 DURATION: 2 years STATUS: 1st year

TITLE: The Pathways and Types of Soil Changes Induced by Aerial Effluents in the AOSERP Study Area

OBJECTIVES:

1. To determine the pathways of sulphur through the soil system.
2. To determine the changes induced in the soil by sulphur along these pathways.
3. To evaluate the changes for their influence on the soil as a growth media.

RESEARCH OUTLINE:

1. Adapt tracer techniques to the conditions in the AOSERP study area.
2. Document the exact procedure with adequate literature citations to AOSER Program Management prior to undertaking any field work.
3. Establish replicated plots of sound satistical design in major vegetation types in the study area for study.
4. Design an experiment to accelerate the application of sulphur to the soil and evaluate the changes in soil microflora and microfauna, and in the vegetation competative relationships.

PROJECT TO BE UNDERTAKEN BY:

Consultant

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 Mar 78 Date

J.P. Bruce, Member for Canada — 10 Mar 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $75,000
CORE ACTIVITY: Research and Development - Restoration of Terrestrial Ecosystems	FEDERAL-PROVINCIAL INTEREST RATIO: 50: 50
PROJECT NO: LS 4.4	DURATION: 2 years STATUS: 1st year

TITLE: Studies of Soil Chemical and Physical Properties in Soils Being Reclaimed to Vegetation

OBJECTIVES:

1. Learn the processes involved in nutrient pathways in soils being reclaimed.
2. Develop nutrient budgets for soils being reclaimed to aid in determining rates and methods of fertilization for best results.
3. Evaluate changes in the physical properties of soils being reclaimed to aid in developing a model of leaching into the hydrologic system of reclaimed areas.

RESEARCH OUTLINE:

These objectives will be fulfilled by:

1. Examining the result of clay lenses and other amendments on water tables in tailings sand and other spoil materials.
2. Examining the chemical nutrient pathways and budgets in tailings sand, tailings sand with peat amendments, overburden, overburden and tailing sand mixtures, and overburden, tailings sand and peat mixtures, and topdressed tailings materials.
3. Examining nutrient cycling in fertilized and unfertilized soils and soil mixtures as outlined in (2) above.

PROJECT TO BE UNDERTAKEN BY:

Consultant

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $90,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 0 : 100
PROJECT NO: LS 5.2	DURATION: 5 years STATUS: 4th year

TITLE: Characterization and Utilization of Peat in the AOSERP Study Area

OBJECTIVES:

1. Characterize the peatlands in the study area according to the existing Canadian taxonomic system.
2. Study the physical and chemical properties of pure peat in storage.
3. Study the physical and chemical properties of peat mixed with overburden in storage.
4. Recommend methods for storage of peat which will optimize its value as a reclamation material.

RESEARCH OUTLINE:

Monitoring of existing peat storage samples should continue to maintain continuity of data. Due to destruction of the sample plots on the Syncrude lease by burying under additional overburden material, it will be necessary to establish new plots of mixed peat and overburden. This should be done in an area under government control such as the Mildred Lake Facility to prevent loss of future research sites.

PROJECT TO BE UNDERTAKEN BY:

Research Council of Alberta, Soils Division

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 June 78 Date

for J.P. Bruce, Member for Canada — 10 May 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $90,000
CORE ACTIVITY: Research and Development	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: LS 7.1	DURATION: 5 years STATUS: 4th year

TITLE: Reclamation Afforestation by Suitable Native and Introduced Tree and Shrub Species

OBJECTIVES:

1. Conduct field research on native and naturalized exotic woody species for survival and growth on pure and amended tailings and spoil materials.
2. Determine causes of mortality and develop mitigation procedures in conjunction with other projects.
3. Test ecotypes from invading populations on other disturbed areas for performing on disturbed soils resulting from surface mining.
4. Develop recommendations of genotypes which should be placed in nursery production for large-scale afforestation trials; and
5. Make recommendations for afforestation planting trials.

RESEARCH OUTLINE:

The primary activity for the 1978-79 fiscal year will be phenotypic selection of superior native and naturalized trees and shrubs, from invading populations on disturbed soils, and preparation for rigorous testing of these specimens in future years. Some selections have been made and some plants will be available for field plot testing this year.

PROJECT TO BE UNDERTAKEN BY:

Energy and Natural Resources - Alberta Forest Service

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 2 May 78

J.P. Bruce, Member for Canada — Date: 10 May 78

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $30,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: LS 7.1.1	DURATION: 3 years STATUS: 2 of 3

TITLE:

Control of Small Mammals on Reclamation Areas in the AOSERP Study Area

OBJECTIVES:

This project will be based on the results obtained in the 1977-78 projects "Control of Small Mammals on Reclamation Areas in the AOSERP Study Area - Literature Review and Problem Analysis". Because of the problems which arose with lease access, some work planned for 1977-78 will need to be done in 1978-79.

RESEARCH OUTLINE:

After an evaluation of project progress a meeting will be held with the personnel of LS 7.1 and LS 7.2 to refine the study plan. It will be necessary to clarify understanding of the severity and nature of the problem, plan a control procedure to protect the research plots for reclamation vegetation, and begin experimental studies on long term biological control methods.

This project is of great interest to both GCOS and Syncrude, so it is anticipated that the project will be jointly funded with AOSERP.

PROJECT TO BE UNDERTAKEN BY:

Consultant

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 2 March 78

for J.P. Bruce, Member for Canada — Date: 10 March 78

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $40,000
CORE ACTIVITY: Baseline States of Terrestrial Ecosystems	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: LS 7.1.2	DURATION: 2 years STATUS: 1 of 2

TITLE:
Baseline States of Small Mammals in the AOSERP Study Area

OBJECTIVES:

1. Establish the species, numbers and distribution of habitats of small mammals in the AOSERP study area.
2. Evaluate the reproductive rate of small mammals in natural conditions.
3. Assess, by literature review and other means as appropriate the cyclic behavior of small mammal populations in the study area, and estimate the current stage of the cycle.

RESEARCH OUTLINE:

1. Review the literature on small mammals relevant to the study area.
2. Trap as necessary to evaluate the population characteristics as outlined in the objectives.
3. Relate the baseline data to project LS 7.1.1.

PROJECT TO BE UNDERTAKEN BY:

Consultant

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND CORE ACTIVITY: Research and Development - Restoration of Terrestrial Ecosystems PROJECT NO: LS 7.2	1978-79 BUDGET: $80,000 FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50 DURATION: 5 years STATUS: 4 of 5

TITLE:
Tests of Native Species for Oil Sands Reclamation

OBJECTIVES:

1. Identify native grass and other herbaceous species suitable for reclamation of land, disturbed by oil sands development, with emphasis on nitrogen fixing species as a part of the seed mix.
2. Evaluate the requirements for propagating potentially useful species.
3. Test selected species for survival and growth under field and simulated field conditions.

RESEARCH OUTLINE:

1. Evaluate the existing plantations of plant material at Vegreville and Mildred Lake, including weeding and other maintenance activities necessary.
2. Evaluate the performance of existing plants in all plots at Vegreville, Mildred Lake, and on the GCOS lease.
3. Through a review of literature and other relevant methods, develop criteria for species evaluation for review by AOSER Program Management.
4. Prepare a study plan to select a limited number of species for experimental field plot testing in successive years.

PROJECT TO BE UNDERTAKEN BY:

Consultant (to be selected this year)

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 79 Date

J.P. Bruce, Member for Canada — 10 Mar 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: Land	1978-79 BUDGET: $35,000
CORE ACTIVITY: Reclamation	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: LS 7.6	DURATION: 6 months STATUS: new

TITLE:

Evaluation of AOSERP Reclamation Research Progress and Needs

OBJECTIVES:

1. Evaluate terms of reference and progress to date of projects dealing with land reclamation which have been funded;
2. Define the work necessary and prepare a schedule of work for maintenance and evaluation during 1978 of the plant materials established under AOSERP contract at Vegreville and Mildred Lake; and
3. Prepare a research plan recommending a set of priorities for reclamation research which should be conducted by AOSERP, with special reference to the period 1979-1980.

RESEARCH OUTLINE:

1. Review the terms of reference and all reports of AOSERP projects dealing with reclamation problems.

2. Relate the research to date to needs of industry and THE Development and Reclamation Review Committee within the constraints of stated AOSERP objectives.

3. Evaluate requirements to maintain Vegreville and Mildred Lake plant material and prepare a schedule of work.

4. Evaluate requirements to evaluate the plant material at Vegreville and Mildred Lake and prepare a schedule of work.

5. Recommend priority reclamation research problems for problem solution which AOSERP should consider. These will be included in the final report and in presentations to the Land System Scientific Advisory Committe and the Reclamation Research Coordinating Committee.

PROJECT TO BE UNDERTAKEN BY:

R. M. Hardy and Associates Ltd.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman ..... Date ..... J.P. Bruce, Member for Canada ..... Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $60,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 50: 50
PROJECT NO: LS 9.1	DURATION: 3 years STATUS: 2nd of 3

TITLE: Reinstatment of Biological Activity in Disturbed Soils and Mine Wastes.

OBJECTIVES:

This study, by supporting and expanding on existing research on mine tailings, is expected to develop the understanding necessary to achieve a self-sustaining microbiological population in soils and tailings materials in the AOSERP study area.

RESEARCH OUTLINE:

These objectives will be fulfilled by:

1. Establishing the baseline condition, biomass, and process levels of relevant native ecosystems.
2. Assessing the nature and rate of development of soil microbiological populations and processes in conjunction with revegetation trials.
3. Examining the effects of various soil amendments on the development and stabilization of soil microbiological populations and processes.
4. Recommending steps to accelerate the development and achievement of ecological stability within the soil microbiological community, including closed systems nutrient cycling.

PROJECT TO BE UNDERTAKEN BY:

Alberta Environment - Research Secretariat

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date 2 March 78

for P. Bruce, Member for Canada — Date 10 March 78

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $110,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 25 : 75
PROJECT NO: LS 10.1	DURATION: 2 years STATUS: 1st of 2

TITLE: Synecology and Autecology of the Boreal Forest Vegetation in the AOSERP Study Area

OBJECTIVES:

1. To review the literature on the physiology and autecology of boreal forest species and on the structure of the vegetation communities in the boreal forest.
2. To produce an annotated bibliography and review article on the subject having particular reference to the AOSERP study area.
3. To determine the successional relationships of vegetation habitat types in the study area (several contracts).

RESEARCH OUTLINE:

Theseobjectives will be fulfilled by:

1. Reviewing the published literature, and any unpublished journals or field notes of early explorers concerning the vegetation of the boreal forest.
2. Giving particular attention to the successional relationships of species and communities, particularily if disturbed.
3. Concentrating on the AOSERP study area but consulting other sources; and
4. Describing and evaluating systematic descriptions and organizations of boreal forest communities, with comparisons of different systems made for suitability to the AOSERP study area.
5. Analyzing the vegetation in the AOSERP study area to develop an understanding of plant community development and competative relationships.

PROJECT TO BE UNDERTAKEN BY:

Consultants

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $20,000
CORE ACTIVITY: Baseline States	FEDERAL-PROVINCIAL INTEREST RATIO: 50 :50
PROJECT NO: LS 10.2	DURATION: 1 Year STATUS: New

TITLE: Baseline Inventory of Aquatic Macrophyte Species Distribution in the AOSERP Study Area.

OBJECTIVES:

1. Obtain baseline data on the distribution of aquatic macrophytes, including emergent, submerged, and floating leaved species as plant communities;
2. Relate these communities to the habitat types for inclusion on maps developed in project LS 2.3.1;
3. Rellate the communities to the physical and chemical environment, including water chemistry, depth, and bottom material; and
4. Map significant rooted communities on the 1:50,000 working maps prepared under project LS 2.3.1.

RESEARCH OUTLINE:

Working from aerial photography, identify significant communities of aquatic macrophytes in the AOSERP Study Area for sampling. Prepare a sampling plan and conduct ground truthing to verify remote sensing identification. Select a subsample of communities to analyze in detail to define and quantify community structure, physical habitat factors, and chemical habitat factors. A definitive literature review of aquatic macrophyte communities is to be prepared as a first step to accompany the mapping from remote sensing as an interim report. This interim report is to be formally accepted prior to implementation of detailed studies, if any are required.

PROJECT TO BE UNDERTAKEN BY:

Consultant.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $40,000
CORE ACTIVITY: Research and Development	FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50
PROJECT NO: LS 11.1	DURATION: 2 years STATUS: New

TITLE: Establishment of Long Term Biomonitoring Plots in the AOSERP Study Area.

OBJECTIVES:

1. Establish permanent biomonitoring plots under the protection of the Alberta Forest Service's Permanent Sample Plot Program;
2. Make the initial measurements and descriptions on the plots for future reference; and
3. Ensure that all significant ecological habitat types are included in the biomonitoring program.

RESEARCH OUTLINE:

Starting with the biomonitoring plots established by project LS 3.4, mark and identify plots for permanent protection from surface disturbance according to the relevant statutes. If additional aerial photography is needed arrange to have it obtained. Identify and mark additional plots as needed to provide a statistically reliable sample of all significant ecological habitat types as identified by projects LS 2.3.1, LS 2.3.2, and LS 10.2. Ensure that the protected plots are of a size and nature to allow periodic reanalysis of overstory and and understory vegetation, soil chemistry and physical properties, soil microbiological populations, and faunal utilization assessment. Provide location descriptions, including access maps, for scientists working on bonafide biomonitoring studies including initial baseline descriptions of the plots.

PROJECT TO BE UNDERTAKEN BY:

Alberta Forest Service

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

YSTEM: Land	1978-79 BUDGET: $600,000 (non-AOSERP funds)
ORE ACTIVITY: Research and Development	FEDERAL-PROVINCIAL INTEREST RATIO: 0 : 100
ROJECT NO: LS 12.1	DURATION: 22 months (June 79 STATUS: Operational

ITLE: Oil Sands Development & Reclamation Model Study

BJECTIVES:

1. Preparation of a development and reclamation model on an Alberta Oil Sands surface mine which would optimize land conservation, reclamation, and oil sands ore conservation.
2. Definition of the implications of reclamation to three levels, a minimum level, an improved level, and an enhanced level.
3. Definition of the implications of different mine sizes, mining techniques, and tailings disposal methods to reclamation and the ultimate land use of the site.

RESEARCH OUTLINE:

1. The consultant will recommend a site for study to the project steering committee for approval;
2. The consultant will develop a final mine and reclamation model which will incorporate effective reclamation plans with the mining operation;
3. Prepare a reclamation plan guideline, defining the type and level of information required in the preparation of the model development and reclamation plan;
4. Prepare a final report acceptable to the Minister.

PROJECT TO BE UNDERTAKEN BY:

Techman Ltd. and Rheinbraun-Consulting Gmbh.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 13 April 78 Date

for J.P. Bruce, Member for Canada — 13 Apr 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAIL

YSTEM: LAND	1978-79 BUDGET: $35,000
ORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 0 : 100
ROJECT NO: LS 21.6	DURATION: 2 years STATUS: 1 of 2

ITLE: Moose, Wolf, Caribou and Bear Habitat Utilization and Requirements and Population Regulation Related to Oil Sands Development.

BJECTIVES:

1. Ensure that the baseline states of the Moose, Wolf, Caribou and Bear populations in the AOSERP study area have been adequately described and quantified;
2. Describe and quantify the utilization of habitats of Moose and Caribou on a seasonal basis, with special emphasis on critical habitats;
3. Describe and quantify relationships between large ungulates and their predators, including man and wolves, in relationship to preferred habitat; and
4. Describe and quantify the factors influencing population regulation within individual wolf packs, including human activities.

ESEARCH OUTLINE:

The original contractor will be completing his involvement in the project.

1. A review of work to date will be undertaken, the results compared to the literature, and final project publication(s) prepared.
2. The state of completion of knowledge of baseline states will be evaluated.
3. Studies for completion of the baseline states and ecological interactions knowledge will be designed with special emphasis on caribou and bear.
4. Habitat maps with critical areas will be developed. Studies will be continued as necessary to ensure large mammal critical areas in the AOSERP study area are described, quantified and mapped.
5. An analysis of applied research necessary to determine the impact of oil sands development on large mammals will be conducted.

PROJECT TO BE UNDERTAKEN BY:

Consultant(s)

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 13 April 78. Date

J.P. Bruce, Member for Canada — 13 Apr 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $40,000
CORE ACTIVITY: Baseline States of Terrestrial Ecosystems	FEDERAL-PROVINCIAL INTEREST RATIO: 75 :25
PROJECT NO: LS 22.1	DURATION: 3 years STATUS: 3 of 3

TITLE:

Avifauna Baseline Studies

OBJECTIVES:

The general objective of this project is to describe the baseline states of the bird resources in the AOSERP study area to provide basic information to assess the potential effect of industrial development on the bird resource and to provide information which can be used in establishing guidelines for habitat reclamation.

RESEARCH OUTLINE:

This research will be conducted by:

1. Determining the habitat requirements for each species or group with special emphasis on areas not previously surveyed;
2. Developing a set of ecological maps for each species or group of species for the AOSERP area indicating production capability with emphasis on critical habitat areas; and
3. Performing censuses and habitat descriptions;
4. Preparing a detailed final report.

PROJECT TO BE UNDERTAKEN BY:

Fisheries and Environment Canada

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 20 March 78 Date

J.P. Bruce, Member for Canada — 10 Mar 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $40,000
CORE ACTIVITY: Applied Research	FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25
PROJECT NO: LS 22.2	DURATION: 3 years STATUS: 3 of 3

TITLE: Rare and Sensitive Species - White Pelicans

OBJECTIVES:

To examine potential impacts of disturbance generated by oil sands development on the White Pelican population of the AOSERP Study Area.

RESEARCH OUTLINE:

This objective will be fulfilled by:

1. Examining the relationship between foraging areas and White Pelican movements and densities
2. Determining the approximate population, population structure and distribution of White Pelican in the area influenced by oil sands development;
3. Determining productivity, phenology and critical habitat of White Pelican in the area; and
4. Developing location maps and habitat requirement descriptions.

Note: The protected status of the birds in the AOSERP Study Area may make further studies redundant. However, that can not be judged at this time.

PROJECT TO BE UNDERTAKEN BY:

Fisheries and Environmental Canada.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 24 March 78 Date

for J.P. Bruce, Member for Canada — 10 March 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND CORE ACTIVITY: Baseline States of Terrestrial Ecosystems PROJECT NO: LS 22.3	1978-79 BUDGET: $30,000 FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25 DURATION: 4 Years STATUS: 4th Year

TITLE: Baseline States of Rare and Sensitive Species

OBJECTIVES:

The general objective of this project is to describe the potential impact of oil sands development on rare and sensitive avian species and provide information which will allow for recommendations to be made on reclamation and management strategies to enhance these wildlife resources in and post development period. This project encompasses:

1. Peregrine falcon population monitoring;
2. Bald Eagle foraging patterns and characteristics of foraging areas and
3. Inventory of Bald Eagles, osprey and colonial species in the Richardson River area.

RESEARCH OUTLINE:

These objectives will be fulfilled by:

1. Examining the relationship between raptors and the aquatic community (i.e. eagles and ospreys);
2. Determining approximate populations of rare and sensitive avifauna in the AOSERP study area;
3. Determining productivity, phenology and critical habitat of rare and sensitive avifauna in the AOSERP Study Area; and
4. Developing location maps and habitat requirement descriptions.

PROJECT TO BE UNDERTAKEN BY:

Fisheries and Environment Canada

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 78 Date

J.P. Bruce, Member for Canada — 10 March 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND	1978-79 BUDGET: $55,000
CORE ACTIVITY: Baseline States of Terrestrial Ecosystems	FEDERAL-PROVINCIAL INTEREST RATIO: 25 : 75
PROJECT NO: LS 23.1	DURATION: 3 years STATUS: 2 of 3

TITLE: Semi-Aquatic Mammals (Beaver, Muskrat, Mink, River Otter).

OBJECTIVES:

The general objective of this project is to determine the role and significance of the semi-aquatic mammal populations in the undisturbed and disturbed boreal forest ecosystem in the AOSERP study area and from this understanding, predict the potential impact of oil sands development and recommend reclamation and management strategies which will enhance these populations in the post development period.

RESEARCH OUTLINE:

This research will be conducted by:

1. Determining population structure, distribution and biomass for each species;
2. Determining habitat requirements and developing an annotated list of characteristics that define habitat;
3. Describing the relationship of each species to plant and fish;
4. Examining importance of the species as prey items;
5. Examining the hydrological consequences of beaver activity;
6. Evaluating the impact of industrial development on the species habitats considering land clearing, stream diversion, sediments and water quality and quantity; and
7. Examining potential impacts of aquatic contamination, including the potential changes in groundwater quality and quantity.

PROJECT TO BE UNDERTAKEN BY:

University of Guelph

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 2 March 78

J.R. Bruce, Member for Canada — Date: 10 March 78

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND CORE ACTIVITY: Baseline States of Terrestrial Ecosystems PROJECT NO: LS 28.1	1978-79 BUDGET: $80,000 FEDERAL-PROVINCIAL INTEREST RATIO: 50 : 50 DURATION: 2 years STATUS: 1 of 2

TITLE: Study of Insect Fauna in the AOSERP Study Area.

OBJECTIVES:

A preliminary investigation of insect fauna in the AOSERP Study Area is required in order to assess the relative importance of this fauna group to the environment of the area. Of particular importance will be an assessment of possible effects on insect fauna of chemical and physical changes in the ecosystems resulting from oil sands developments.

The first stage will be a problem analysis based upon a literature review, and production of recommendations for further action if needed.

RESEARCH OUTLINE:

This research will be conducted by:

1. Reviewing the literature pertinent to the AOSERP study area, examining existing insect collections from the region, and producing an annotated bibliography;
2. Identifying knowledge gaps related to insect fauna of the AOSERP area;
3. Identifying insect families and/or genera which might be used as indicators of environmental change;
4. Identifying at appropriate taxonomic levels groups of insects which may be important to human occupation and use, reclamation and revegetation, and vectoring of parasites and diseases; and
5. Recommending a comprehensive insect investigation.

PROJECT TO BE UNDERTAKEN BY:

Consultant (Dr. A Nimmo on wage appointment at present).

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 Aug 78 Date

J.P. Bruce, Member for Canada — 10 Aug 78 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: LAND CORE ACTIVITY: Applied Research - Effects on Terrestrial Ecosystems PROJECT NO: LS 29.1	1978-79 BUDGET: $90,000 FEDERAL-PROVINCIAL INTEREST RATIO: 75 : 25 DURATION: 2 years STATUS: 1 of 2

TITLE: Baseline Levels of Contaminents in Birds and Mammals

OBJECTIVES:

1. Determine the existing levels of toxic compounds in faunal components of the terrestrial ecosystem to serve as a comparison for buildup due to emissions from oil sands development and
2. Evaluate the probable pathways such toxic elements will take in the ecosystem and develop a biomonitoring plan to detect them at a pre-critical level. The biomonitoring plan is to be integrated with that of LS 11.1 as much as possible.

RESEARCH OUTLINE:

To be defined by existing study in progress by a consultant.

PROJECT TO BE UNDERTAKEN BY:

To be determined.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Sołodzuk, Chairman — 14 March 78 Date

J.F. Bruce, Member for Canada — 23/3 Date

CANADA-ALBERTA

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

SYSTEM AUTHORIZATION: Human System

DESCRIPTION:

Research in the Human System is oriented to establishing baseline states for demographic patterns and social conditions in the study area and the changes which may occur in these as a result of oil sands development. A major objective of the research will be to gain an understanding of how the effects of undesirable social changes may be minimized and beneficial effects maximized. Research in human ecology will also be aimed to providing an understanding of the relationships between people and their environments in the study area; including both the urban and natural environments and the resources for human use in those environments.

Research in the Human System will continue along three main lines (core activities): 1) defining baseline states of the human environment in an historical and regional content: 2) identifying and monitoring the impact over time of oil sands development upon the human environment: and 3) studying the relationship between people in the study area and the changing urban and natural environments.

ESTIMATED BUDGET ($K):

FISCAL YEAR	APPROXIMATE BUDGET	SHARE	
		CANADA	ALBERTA
1975-76	58	-	58
1976-77	131	-	131
1977-78	140	-	140
1978-79	250	-	250
1979-80	300	-	300
TOTAL	879	-	879

APPROVAL:

The following budget is approved for 1978-79 fiscal year:

CANADA [-] ALBERTA [250]

APPROVED FOR ALBERTA:

MINISTER

2 March 78
Date

APPROVED FOR CANADA :

MINISTER

March 9, 1978
Date

AOSERP

1978-79 BUDGET SUMMARY BY PROJECT ($K)

SYSTEM: HUMAN

PROJECT NO.	TITLE	FEDERAL-PROVINCIAL INTEREST RATIO	BUDGET ALLOCATION
HS 10.1	Oral History of the Athabasca Oil Sands Region	0:100	10
HS 10.2	History of Population Migrations	0:100	30
HS 20.1	Economic Overview - Athabasca Oil Sands Region	0:100	25
HS 30.1	Longitudinal Study	0:100	120
HS 40.1	Native Employment Patterns	0:100	25
HS 50.1	Perception of Environmental Attributes	0:100	10
HS 50.2	Physiological Effects on People from Oil Sands Development	0:100	10
HS 50.4	Recreational Use of Natural Resources	0:100	10
HS 50.5	Consumptive Use of Natural Resources	0:100	10
	TOTAL		250

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: HUMAN	1978-79 BUDGET: $10,000
CORE ACTIVITY: BASELINE STATES	FEDERAL-PROVINCIAL INTEREST RATIO: - : 100
PROJECT NO: HS 10.1	DURATION: 2 years STATUS: 2 of 2

TITLE: ORAL HISTORY OF THE ATHABASCA OIL SANDS REGION

OBJECTIVES: To record, analyze and interpret the oral historical recollections of people who have lived for approximately fifty years in the oil sands communities, in order to provide a historical context for the study of impacts of oil sands development on the following areas:

1. Human Habitat
2. Economic History
3. Population Migration
4. Relationship between Society and the Various Levels of Government.

RESEARCH OUTLINE:

The project is to be completed by 31 December 1978.
The interviews are to be completed by 31 July 1978.
An interim report is to be submitted by 31 July 1978.
The period between 31 July 1978 and 31 October 1978 is to be devoted to supplementary interviews and to analysis and interpretation of the information recorded on tapes.
Final report is to be submitted in a draft form by 31 October 1978.

PROJECT TO BE UNDERTAKEN BY:

Boreal Institute, University of Alberta

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — Date: 2 March 78

J.P. Bruce, Member for Canada — Date: 10 March 78

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: HUMAN	1978-79 BUDGET: $30,000
CORE ACTIVITY: BASELINE STATES	FEDERAL-PROVINCIAL INTEREST RATIO: - : 100
PROJECT NO: HS 10.2	DURATION: 2 years STATUS: 1 of 2

TITLE: HISTORY OF POPULATION MIGRATIONS IN THE ATHABASCA OIL SANDS REGION BETWEEN 1890's and 1960's.

OBJECTIVES: To determine and analyze the nature if impacts of in- migrating peoples on indigenous people of the oil sands region during the last hundred years, in order to establish a broad historical context for the analyses of contemporary demographic, economic and social impacts associated with the oil sands development.

RESEARCH OUTLINE:

This study is to rely on traditional historical research methods utilizing the existing primary and secondary sources, and the information provided by HS 10.1 Oral History project.

While the main focus will be on population migrations the study is also to analyze:
1. human habitat
2. economic history
3. relationship between society and the various levels of government.

PROJECT TO BE UNDERTAKEN BY:

Boreal Institute, University of Alberta

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: HUMAN	1978-79 BUDGET: $25,000
CORE ACTIVITY: BASELINE STATES	FEDERAL-PROVINCIAL INTEREST RATIO: - : 100%
PROJECT NO: HS 20.1	DURATION: 1 year STATUS: 1 of 1

TITLE:

ECONOMIC OVERVIEW: The Chronology and Characteristics of Economic Evolution in the Athabasca Oil Sands Region since 1960.

OBJECTIVES: To document, describe and explain the evolution of the local economy since 1960, including the following sectors:

- the oil sands industry;
- the forest and timber industry;
- the traditional economic base activities such as hunting, trapping, and fishing;
- the agricultural industry;
- tourism and recreation industry;
- transportation and construction industries;
- trade and service sectors.

RESEARCH OUTLINE: The research will involve two Phases:

Phase I

On the basis of existing literature:

- establish the chronology of economic evolution;
- identify the enterprises and catalogue qualitatively the goods and services produced in the local economy; and
- identify the sources of quantitative data and extract the easily accessible data.

Phase II

On the basis of administrative sources, existing literature, and industry's documents, provide full-scale quantitative analyses to determine the changes in the mix of local production.

PROJECT TO BE UNDERTAKEN BY:

Consultant.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 (Date)

J.P. Bruce, Member for Canada — 2 March 1978 (Date)

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: HUMAN	1978-79 BUDGET: $120,000
CORE ACTIVITY: APPLIED RESEARCH	FEDERAL-PROVINCIAL INTEREST RATIO: - : 100%
PROJECT NO: HS 30.1	DURATION: 4 years STATUS: 2 of 4

TITLE: LONGITUDINAL STUDY OF SOCIAL CHARACTERISTICS AND PERSONAL ADJUSTMENT IN THE ATHABASCA OIL SANDS REGION.

OBJECTIVES:

- Identify and analyze changes in social conditions in the oil sands region since 1961, in relation to various phases of oil sands development;
- Identify and analyze the specific social and personal problems faced by people in their efforts to adjust to life in the region.
- Identify the relationships that exist between social conditions in the region and the adjustment processes of people at different stages of the oil sands development.

RESEARCH OUTLINE: This research is divided into three phases extending over the four fiscal years from 1977-78 to 1980-81.

Phase I including research design and instruments development to be completed by 31 March 1978.

Phase II-of the project including first field measurements, data analyses and the final report (Volume I report of the project) containing the baseline states is to be completed by 30 June 1979.

Phase III- of the study analyzing and explaining the impacts of oil sands development on people is to be completed by 31 March 1981.

PROJECT TO BE UNDERTAKEN BY:

Consultant: Earl Berger Ltd., Edmonton

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978 /9 PROJECT DETAILS

SYSTEM: HUMAN	1978-79 BUDGET: $25,000
CORE ACTIVITY: APPLIED RESEARCH	FEDERAL-PROVINCIAL INTEREST RATIO: - : 100%
PROJECT NO: HS 40.1	DURATION: 2 years STATUS: 2 of 2

TITLE: NATIVE EMPLOYMENT PATTERNS IN THE ATHABASCA OIL SANDS REGION.

OBJECTIVES: To determine and analyze all employment patterns of indigenous, in-migrant and transient Native workers in the region, with emphasis on the workers in the major industries;

To assess the effectiveness of existing training-employment programs which are to facilitate the adjustment of Native people to the industrial environment of the future;

To identify means which would help Native people to successfully cope with the industrial work world.

RESEARCH OUTLINE:

This research will focus on such variables as:
numbers employed, number of jobs held, types of jobs, duration, job satisfaction, previous work experience, underemployment, unemployment, employment in traditional Native occupations, social assistance, etc.

Factors analyzed will include:
company and/or government regulation; informal interpersonal network providing the information upon which people rely to apply for work; beliefs (self-image) about one's ability to obtain a job; training through which a person acquires skills and attitudes compatible with the industrial work world; and provisions made by specific industries to accommodate Native culture.

PROJECT TO BE UNDERTAKEN BY:

Consultant.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman _____ Date

J.P. Bruce, Member for Canada _____ Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: HUMAN	1978-79 BUDGET: $10,000
CORE ACTIVITY: BASELINE STATES	FEDERAL-PROVINCIAL INTEREST RATIO: - : 100%
PROJECT NO: HS 50.1	DURATION: 1 year STATUS: 1 of 1

TITLE: ENVIRONMENTAL PERCEPTIONS: Conceptual Problems involved in the Perception of Environmental Attributes in the AOSERP Study Area.

OBJECTIVES: Relying on review of relevant literature, this is to clarify the conceptual and empirical issues involved in the relationship between the Athabasca oil sands development and the perception of natural and man-made environmental attributes by people residing and/or working in the AOSERP study area.

This study is to relate the concept of "quality of life" to the perceptions of environment; and is to provide Part 1 of a conceptual framework for integrating the biophysical and Human System environmental research.

RESEARCH OUTLINE: The relevant literature will include that on environmental perception, perception in resource management, environmental hazard perception, factors affecting perception such as personality characteristics and basic attitudes towards environments.

Environmental attributes considered will include geographical location, atmospheric conditions, water, soils, vegetation, land use, terrestrial and aquatic fauna, and urban developments. Special emphasis will be place on perception of environmental hazards in the oil sands region such as air, water and noise pollution.

PROJECT TO BE UNDERTAKEN BY:

Consultant.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: HUMAN	1978-79 BUDGET: $10,000
CORE ACTIVITY: BASELINE STATES	FEDERAL-PROVINCIAL INTEREST RATIO: - : 100%
PROJECT NO: HS 50.2	DURATION: 1 year STATUS: 1 of 1

TITLE: PHYSIOLOGIAL EFFECTS: Effects of Changes in Natural and Man-made Environments on Human Physiology in the AOSERP Study Area

OBJECTIVES: Relying on existing literature and the relevant research, this study is to clarify the conceptual and empirical issues involved in the relationship between the Athabasca oil sands development and the physiological effects of changes in the natural and man-made environments on people res'ding and/or working in the AOSERP study area.

This study is to provide Part II of a conceptual framework for integrating the bio-physical and Human System environmental research.

RESEARCH OUTLINE:

The environmental factors considered with respect to physiological effects on people will include: geographical location, atmospheric conditions, water, soils, vegetation, land use, terrestrial and aquatic fauna, and urban developments. Also included will be the effects of environmental hazards such as air, water and noise pollution.

PROJECT TO BE UNDERTAKEN BY:

Consultant.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: HUMAN	1978-79 BUDGET: $10,000
CORE ACTIVITY: APPLIED RESEARCH	FEDERAL-PROVINCIAL INTEREST RATIO: : - 100%
PROJECT NO: HS 50.4	DURATION: 2 years STATUS: 1 of 2

TITLE: RECREATIONAL USE OF NATURAL RESOURCES IN THE ATHABASCA OIL SANDS REGION.

OBJECTIVES: To determine and analyze the effects of growth of industrial population upon recreational use of natural environment, in order to identify means (e.g. educational programs) which would help prevent any negative effects of human activities on natural environment; and to identify demand for future recreational facilities.

RESEARCH OUTLINE: This research will consist of two parts.

Part I. A field survey will be conducted in the Gregoire Lake Park area to determine the frequency and intensity of its use; socio-economic and cultural characteristics of the users; the basic attitudes towards natural environment; and the usual and anticipated recreational activities.

Part II. Relying on the additional relevant information provided by the Longitudinal Study HS 30.1, the research on the recreational use of natural resources will be developed with respect to supply and demand dynamics. This is to provide information relevant to planning for future recreational services and facilities.

PROJECT TO BE UNDERTAKEN BY:

Consultant.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

1978-79 PROJECT DETAILS

SYSTEM: HUMAN	1978-79 BUDGET: $10,000
CORE ACTIVITY: BASELINE STATES	FEDERAL-PROVINCIAL INTEREST RATIO: - : 100%
PROJECT NO: HS 50.5	DURATION: 2 years STATUS: 1 of 2

TITLE:

CONSUMPTIVE USE OF NATURAL RESOURCES: Domestic Fishing, Hunting and Trapping in the AOSERP Study Area.

OBJECTIVES:

This is to determine and analyze the significance of domestic fishing, hunting and trapping in the AOSERP Study Area. The research is to establish the baseline states and to identify, quantify and evaluate the effects of the increasing population in the oil sands region on the domestic fishing, hunting and trapping.

RESEARCH OUTLINE: The research will:

1. Examine the historical and present status of domestic fishing, hunting and trapping in the study area;
2. Examine the motives, aspirations and expectations of domestic fishermen, hunters and trappers with the view of predicting their future activities as development proceeds;
3. Document the current domestic fishery, game and fur management practices;
4. Considering several possible development scenarios, recommend alternative management strategies in the light of predicted impacts.

PROJECT TO BE UNDERTAKEN BY:

Consultant.

PROJECT APPROVED BY STEERING COMMITTEE:

W. Solodzuk, Chairman — 2 March 1978 Date

for J.P. Bruce, Member for Canada — 2 March 1978 Date

CANADA-ALBERTA

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

SYSTEM AUTHORIZATION: Program Management

DESCRIPTION:

Program Management is the organizational unit which provides research planning, direction, management and support services essential to the conduct of research projects and the reporting of research findings. It is also the channel through which recommendations for funding may be passed to the Steering Committee. Support services are provided through a Program Management office in Edmonton and a field office and research facility in the Athabasca Oil Sands area.

ESTIMATED BUDGET ($K):

FISCAL YEAR	APPROXIMATE BUDGET	SHARE	
		CANADA	ALBERTA
1975-76	280	-	280
1976-77	468	102	366
1977-78	946*	687	259
1978-79	500	247.8	252.5
1979-80	500	250	250
TOTAL	2,694	1,286.5	1,407.5

* Includes Program Contingency Fund in 1977-78

APPROVAL:

The following budget is approved for the 1978-79 fiscal year:

CANADA [247.5] ALBERTA [252.5]

APPROVED FOR ALBERTA:

MINISTER

2 March 78
Date

APPROVED FOR CANADA :

MINISTER

March 9, 1978
Date

AOSERP

1978-79 BUDGET SUMMARY ($K)

SYSTEM: Program Management

PROJECT NO.	TITLE	FEDERAL-PROVINCIAL INTEREST RATIO	BUDGET ALLOCATION
N/A	PROGRAM ADMINISTRATION	50:50	250
N/A	PROGRAM SUPPORT SERVICES	≃ 50:50	250
	TOTAL		500